

REMARKS/ARGUMENTS

**1) Status of the claims.**

Claims 21-26 are new; upon entry of the amendment, Claims 1-26 will be pending.

**2) Support for new claims.**

New claims 21-26 are supported, for example, respectively, at previously presented Claims 1-6, in combination with specification pages 1-2.

No new matter is added.

**3) Summary of the Interview Substance.**

Applicants thank Examiner McAvoy for the helpful and courteous discussion of January 28, 2010, wherein it was agreed that Applicants could, in addition to composition claims, submit method claims, and wherein it was agreed that Applicants would submit arguments and data favoring patentability. The discussion and the permission to submit method claims are truly appreciated.

**4) The obviousness rejection of Claims 1-10 and 16-20 as being unpatentable in view of Yoshida in combination with Holubec or Matsuno is traversed** (Office Action page 2).

Present Claim 1 is the sole independent claim. Claims 2-26 depend, either directly, or indirectly, from present Claim 1.

Present Claim 1 is drawn to a traction drive fluid composition which comprises component (A) a base oil for traction drives selected from hydrogenated products of the dimers of at least one alicyclic compound selected from among bicyclo [2, 2, 1]heptane ring-bearing compounds, bicyclo [3, 2, 1] octane ring-bearing compounds, bicyclo [2 2, 2] octane ring-bearing compounds, and bicyclo [3, 3, 0] octane ring-bearing compounds; and from cyclohexane ring-bearing compounds selected from the group consisting of 2,4-dicyclohexyl-

2-methylpentane, 2,4-dicyclohexylpentane, 2,4-dicyclohexyl-2-methylbutane, and 1-decahydronaphthyl-1-cyclohexylethane and

component (B) at least one polymer having a weight average molecular weight in the range of 8,000 to 40,000 and which is selected from the group consisting of (a) hydrocarbon polymers each comprising as a constituent at least 10 mole% of a monomer bearing a cyclic structure and (c) hydrogenated products from the polymers (a); wherein each of the hydrocarbon polymers (a) is a polymer of a monomer bearing a cyclic structure, or a copolymer of a monomer bearing a cyclic structure and an aliphatic monomer selected from the group consisting of ethylene, propylene, butene, pentene, hexene, heptene, octane, nonene and decene.

Applicants traverse the obviousness rejection on the basis of two superior and unexpected results: 1) the addition of the component B in the traction drive fluid composition of Claim 1 surprisingly does not decrease the traction coefficient; and 2) that addition of component B in Claim 1 surprisingly does not significantly increase kinematic viscosity at 100°C. Neither of these superior results are described or suggested by the cited references, making these superior results, in light of the cited references, unexpected results.

Before describing the data that supports these superior and unexpected results, Applicants note that, at pages 4-5 of the Official Action, the Office asserts, concerning the results present in the inventors declaration along with the previous Office Action (that the addition of component B in the traction drive fluid composition of Claim 1 surprisingly does not decrease the traction drive fluid composition), that “the claims at issue are drawn to a traction drive fluid composition and NOT a method of using the composition in a transmission such as a continuously variable transmission,” that “the examiner is not convinced that the results presented are unexpected to the skilled worker” because an “approximately 1% difference reported by Matsuno for two different viscosity index

improvers versus the 0% difference for the claimed viscosity index improvers in the property traction coefficient does not rise to the level of superior and unexpected results as argued.”

Responsive to the Offices assertions, Applicants initially note the following:

i) Method claims have been added (e.g., Claims 21-26);

ii) The superior and unexpected results, as a matter of law, need not be recited in the claims as the Office is attempting to assert. M.P.E.P. § 716.01(b) contains the subheading: TO BE OF PROBATIVE VALUE, ANY SECONDARY EVIDENCE MUST BE RELATED TO THE CLAIMED INVENTION (NEXUS REQUIRED) (emphasis added). § 716.01(b) further describes, in part, “[t]o be given substantial weight in the determination of obviousness or nonobviousness, evidence of secondary considerations must be relevant to the subject matter as claimed, and therefore the examiner must determine whether there is a nexus between the merits of the claimed invention and the evidence of secondary considerations (emphasis added).” Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 305 n.42, 227 USPQ 657, 673-674 n. 42 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986). “The term “nexus” designates a factually and legally sufficient connection between the objective evidence of nonobviousness and the claimed invention so that the evidence is of probative value in the determination of nonobviousness.” Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 7 USPQ2d 1222 (Fed. Cir.), cert. denied, 488 U.S. 956 (1988). Thus, the evidence of non-obviousness is not required to be recited in the claims, and the Office’s basis for rejection therefore has no merit. Rather, the law merely requires there be a nexus between the claimed inventive embodiments and the evidence of the secondary considerations. In the present composition claims, there is a nexus between the claims and the superior and unexpected results, because employment of the claimed compositions gives rise to the superior and unexpected results.

iii) While Applicants submit the fact that the addition of the component B in the traction drive fluid composition of Claim 1 surprisingly does not decrease the traction coefficient is exactly the type of secondary consideration envisioned by the M.P.E.P. to address a *prima facie* case of obviousness, Applicants further note (*supra* and *infra*) that the addition of the component B in Claim 1, surprisingly in light of the cited references, does not significantly increase the kinematic viscosity of a base oil at 100°C. Neither of these superior results are described or suggested by the cite references, making these superior results, in light of the cited references, unexpected results.

Applicants traverse the obviousness rejection on the basis of a first superior and unexpected result. In a continuously variable transmission (CVT) vehicle, power is transferred from the engine by contact between to essentially smooth surfaces. Thus, a CVT is different from a conventional transmission, where power is transferred from the engine via toothed gears. The efficiency of the power transfer between the two surfaces of in a CVT is quantified by the traction coefficient. The higher the traction coefficient, the more efficient the power transfer. Lower traction coefficients result in lower mileage and, as a result, negatively impact the environment. The oil that lubricates the two surfaces (e.g., the base oil) can alter the traction coefficient.

In the cited references, addition of a viscosity index improver to a base oil results in lowering of the traction coefficient. For example, column 27, Table 3, in Matsuno is reproduced below:

TABLE 3

Fluid 1	Composition (mass %)				Kinematic Viscosity at 100° C	Brookfield Viscosity at -30° C	Traction Coefficient
	Component D				mm <sup>2</sup> /s	mPa · s	
	PMA	PIB	OCP				
Fluid 5	91.0	9.0	—	—	5.0	360	0.079
Fluid 6	91.8	—	8.2	—	5.0	520	0.084
Fluid 7	96.7	—	—	3.3	5.0	380	0.084
Fluid 1	100	—	—	—	2.1	200	0.085

PMA: Number average molecular weight (Mn) of 18,000

PIB: Number average molecular weight (Mn) of 2,700

OCP: Number average molecular weight (Mn) of 9,900

In Table 3, Fluid 1, that does not have a viscosity index improver (e.g., no component D), has a traction coefficient of 0.085. In Fluids, 5-7, when a component D is added, in all cases, the traction coefficient drops (e.g., to 0.084 or to 0.079). At column 28, lines 1-4, Matsuno describes in part that “the viscosity at high temperatures can be significantly increased by mixing Component (D) without changing the traction coefficient and low temperature viscosity too much” (underlining emphasis added). Thus, Matsuno, in both tabular data and words, acknowledges that adding a viscosity index improver to a fluid (e.g., a base oil) lowers the traction coefficient of the fluid. Holubec and Yoshida do not contradict the teachings of Matsuno.

This phenomena of addition of a viscosity index improver to a base oil lowering the traction coefficient of the base oil is further demonstrated in the originally filed specification. Reference Example 1, of Table 1-1 at page 18 of the originally filed specification, which is a base oil that does not contain a viscosity improver, has a traction coefficient of 0.077. Comparative Example 3 of the originally filed specification adds a viscosity improver (e.g., an ethylene/propylene copolymer, not of the invention) to the base oil of Reference Example 1. As shown in Table 1-1, at page 18 of the originally filed specification, the addition of the viscosity improver results undesirably in a lowering of the traction coefficient from 0.077 to 0.074.

Accordingly, Applicants submit that one of ordinary skill in the art, based on the teachings of Matsuno, Holubec and Yoshida, would expect that addition of a viscosity improver to a base oil would undesirably lower the base oil's traction coefficient.

In contrast to this expectation, the addition of the component (B) to the base oil (A) of present Claim 1 does not lower the traction coefficient of the base oil (A), and in some cases, actually raises the traction coefficient.

In specification inventive Example 1, Table 1-1, specification page 18, addition of a polymer having an average molecular weight of 14,000 (see specification page 12, line 28) to the base oil of Reference Example 1 did not lower the traction coefficient, which remained at 0.077. Similarly, in specification inventive Example 2, addition of an inventive polymer having an average molecular weight of 18,000 (see specification page 13, line 12) did not lower the traction coefficient. Further in inventive specification Example 3, addition of a polymer having an average molecular weight of 9,000 (see specification page 13, line 25) did not lower the traction coefficient.

In specification inventive Examples 4 and 6-8, Table 1-2, specification page 9, individual polymers having average molecular weights, respectively, of 18,000; 13,000; 23,000; and 38,000; were added to the base oils of Reference Examples 1 and /or 2 and the addition of these polymers did not result in lowering of the traction coefficient of the base oil relative to the coefficient of the base oil without added polymer, and in the case of inventive Examples 7 and 8, actually raised the traction coefficient.

Based on the teachings of Matsuno, Yoshida and Holubec, *supra*, one of ordinary skill in the art would expect that addition of a viscosity index improver to a base oil would undesirably decrease the traction coefficient of the base oil. As described, *supra*, addition of inventive polymers having average molecular weights of 9,000; 13,000; 14,000; 18,000; 23,000; and 38,000; to different base oils did not decrease, and in two examples increased,

the traction coefficient of the base oil. This superior result, based on the teachings of Matsuno, Yoshida and Holubec, is also an unexpected result. In the previously issued Advisory Action, at page 2, the Office acknowledges the arguments, *supra*, but states “[u]nexpected results have not been presented for the entire scope of the claims.” Responsive to Office’s comment, Applicants previously submitted a Declaration, the contents of which are referenced herein.

In the Declaration, in Examples A-D, polymers I-IV, respectively, with average molecular weights of 8,900; 29,700; 8,560, and 26,034; are added, individually and separately, in an amount of 1.5% by mass, to individual, separate batches of Fluid A, to form inventive Examples A-D (see pages 2-3 of the Declaration). In Table 1-1 of the Declaration, the traction coefficient of the Fluid A, without any added polymer, is 0.077. As shown in inventive Examples A-D of Table 1-1, the traction coefficient of Fluid A, when polymers I-IV were added, did not decrease, as would be expected based on the teachings of Matsuno, Yoshida and Holubec, *supra*. As described at page 5 of the Declaration, this superior result is an unexpected result.

At Declaration inventive Examples, E-H, polymers I-IV respectively, with molecular weights of 8,900; 29,700; 8,560, and 26,034; are added, individually and separately, in an amount of 1.5% by mass, to individual, separate batches of Fluid B, to form inventive Examples E-H (see pages 3-4 of the Declaration). As shown in inventive Examples E-H of Table 1-1, the traction coefficient of Fluid A, when polymers I-IV were added, did not decrease, as would be expected based on the teachings of Matsuno, Yoshida and Holubec, *supra*. As described at page 5 of the Declaration, this superior result is an unexpected result.

Thus, between the specification Examples and the Declaration Examples, inventive polymers with molecular weights of 8,560; 8,900; 9,000; 13,000; 14,000; 18,000; 23,000; 26,034; 29,700; and 38,000; are added to at least one of two different fluids, in these

inventive embodiments, the traction coefficient of each fluid containing an added polymer did not decrease – a surprising and unexpected result.

As described *supra*, the average molecular weight range of the present Claim 1 polymers ranges from “8,000 to 40,000.” Applicants submit the inventive Example polymer molecular weights ranging from 8,560 at the low end to 38,000 at the high end, described, *supra*, demonstrate results commensurate in scope with the Claim 1 weight range.

Moreover, as described, for example, under Table 1-2, Declaration page 5, the polymers employed in the Declaration are either hydrogenated polystyrene or hydrogenated ethylene / styrene copolymers. The polymers of present Claim 1 are “(a) hydrocarbon polymers each comprising as a constituent at least 10 mole% of a monomer bearing a cyclic structure and (c) hydrogenated products from the polymers (a); wherein each of the hydrocarbon polymers (a) is a polymer of a monomer bearing a cyclic structure, or a copolymer of a monomer bearing a cyclic structure and an aliphatic monomer selected from the group consisting of ethylene, propylene, butene, pentene, hexene, heptene, octane, nonene and decene.” Hydrogenated polystyrene is a hydrogenated product of a hydrocarbon polymer comprising as a constituent at least 10 mole% of a monomer bearing a cyclic structure. Hydrogenated polystyrene / ethylene copolymer is a “copolymer of a monomer bearing a cyclic structure and an aliphatic monomer selected from ethylene...” Similarly, the polymers of specification Example 1 is hydrogenated polystyrene; the polymer of specification Example 2 is a hydrogenated ethylene/styrene copolymer; the polymer of specification Example 3 is a hydrogenated ethylene/styrene copolymer; the polymer of specification Example 4 is a hydrogenated ethylene/styrene copolymer; the polymer of specification Example 6 is an ethylene/alpha-methylstyrene copolymer; the polymer of specification Example 7 is an ethylene/norbornene copolymer; and the polymer of specification Example 8 is a ethylene/dicyclopentadiene copolymer.



Finally, the base oils in present Claim 1 are “selected from hydrogenated products of the dimers of at least one alicyclic compound selected from among bicyclo [2, 2, 1] heptane ring-bearing compounds, bicyclo [3, 2, 1] octane ring-bearing compounds, bicyclo [2 2, 2] octane ring-bearing compounds, and bicyclo [3, 3, 0] octane ring-bearing compounds; and from cyclohexane ring-bearing compounds selected from the group consisting of 2,4-dicyclohexyl-2-methylpentane, 2,4-dicyclohexylpentane, 2,4-dicyclohexyl-2-methylbutane, and 1-decahydronaphthyl-1-cyclohexylethane.” As described at specification page 11, the fluid of Reference Example 1 / Fluid A is a dimer. As described at specification page 12, 2,4-dicyclohexyl-2-methylpentane is a cyclohexane ring bearing compound.

Thus, Applicants submit the specification and Declaration Examples present superior and unexpected results that, taken together, are commensurate in scope with the claims. Withdrawal of the obviousness rejection is requested on this basis alone.

Further, Applicants traverse the obviousness rejection on the basis of a second superior and unexpected result. Applicants have submitted, along with this paper, the following reference for the Office’s consideration: Idemitsu Tribo Review No. 28-2005 (herein after the submitted reference).

Applicants note, without being bound by theory, that generally, a relationship between a temperature and a traction coefficient ( $\mu$ -T relationship) shows maximum  $\mu$  at a certain temperature, as shown, for example, at Figure 7 in the submitted reference. A traction coefficient is maximized when shear stress (traction) of an oil film is maximized (e.g., when the oil has a kinematic viscosity of 15~20 mm<sup>2</sup>/s). Therefore, a maximum  $\mu$  of a high viscosity oil would be observed at a high temperature, and that of a low viscosity oil would be observed at a low temperature.

The component (B) of present Claim 1 and the claims depending therefrom has at least the following effects:

- a) it does not undesirably decrease the traction drive coefficient of the base oil, as described *supra*, and
- b) it displays an effect concerning a high temperature shift of a  $\mu$ -T relation curve because of a viscosity increase.

As described previously, the cited references do not describe or suggest the superior result a), *supra*.

Additionally, an increase in kinematic viscosity of the composition of present Claim 1, when compared to a base oil alone, is significantly reduced at 100°C, in comparison to Matsuno. This superior and unexpected result is not described or suggested by the cited references.

Applicants present below comparative data between the presently claimed inventive embodiments and Matsuno.

	Ref. Ex. 1	Ex. 1	Ex. 2	Ex. 3	Comp. Ex. 1
Kinematic viscosity at 100°C of the base oil	3.578	3.578	3.578	3.578	3.578
Kinematic viscosity at 100°C of the composition	-	4.307	4.649	4.162	7.971
A ratio of kinematic viscosity (composition / base oil)	-	1.204	1.299	1.163	2.228
Viscosity decrease after shear stability test (%)	-0.1	-0.16	-0.9	-0.5	-31.5
Traction coefficient at 140°C	0.077	0.077	0.077	0.077	0.077

	Comp. Ex. 2	Comp. Ex. 3	Ex. 7	Ex. 8
Kinematic viscosity at 100°C of the base oil	3.578	3.578	3.578	3.578
Kinematic viscosity at 100°C of the composition	4.033	4.620	4.737	4.891
A ratio of kinematic viscosity (composition / base oil)	1.127	1.291	1.324	1.367
Viscosity decrease after shear stability test (%)	-0.2	-0.7	-1.1	-2.3
Traction coefficient at 140°C	0.077	0.074	0.077	0.077

	Ref. Ex. 2	Ex. 4	(Ex. 5)	Comp. Ex. 4	Ex. 6
Kinematic viscosity at 100°C of the base oil	3.572	3.572	3.572	3.572	3.572
Kinematic viscosity at 100°C of the composition	-	4.530	4.840	5.339	4.275
A ratio of kinematic viscosity (composition / base oil)	-	1.268	1.355	1.495	1.197
Viscosity decrease after shear stability test (%)	-0.1	-0.9	-0.9	-7.3	-2.8
Traction coefficient at 140°C	0.070	0.071	0.070	0.070	0.070

[Matsuno]

	Fluid 1	Fluid 5 (+PMA)	Fluid 6 (+PIB)	Fluid 7 (+OCP)
Kinematic viscosity at 100°C of the base oil	2.1	2.1	2.1	2.1
Kinematic viscosity at 100°C of the composition	-	5.0	5.0	5.0
A ratio of kinematic viscosity (composition / base oil)	-	2.4	2.4	2.4
Traction coefficient at 100°C	0.085	0.079	0.084	0.084

As shown in the data, Matsuno's ratio of kinematic viscosity at 100°C of composition to base oil is very large (2.4:1) (see the third line of the Table under the heading of Matsuno). In contrast, in present Claim 1, the ration of kinematic viscosity at 100oC of composition to base oil is surprisingly, based on the cited references, small (e.g., 1.163:1 see, for example, Example 3, in the first Table, *supra*). This superior result is, in light of the cited references, an unexpected result. Applicants submit this superior and unexpected result is exactly the

type of secondary consideration envisioned by the M.P.E.P. to address a *prima facie* case of obviousness. The result has a nexus to the claimed composition. Withdrawal of the obviousness rejection is requested on this basis alone.

**5) The obviousness rejection of Claims 1-10 and 16-20 as being unpatentable in view of Abe in combination with Holubec or Matsuno is traversed** (Office Action page 5).

As described *supra*, the composition of Claim 1 produces two superior results: 1) the addition of the component B in the traction drive fluid composition of Claim 1 does not decrease the traction coefficient; and 2) the addition of component B in Claim 1 does not significantly increase kinematic viscosity at 100°C. These results are not described or suggested by the cited references, making them superior and unexpected results in light of the cited references. Applicants submit these superior and unexpected results are exactly the types of secondary considerations envisioned by the M.P.E.P. to address a *prima facie* case of obviousness. Withdrawal of the obviousness rejection is requested.

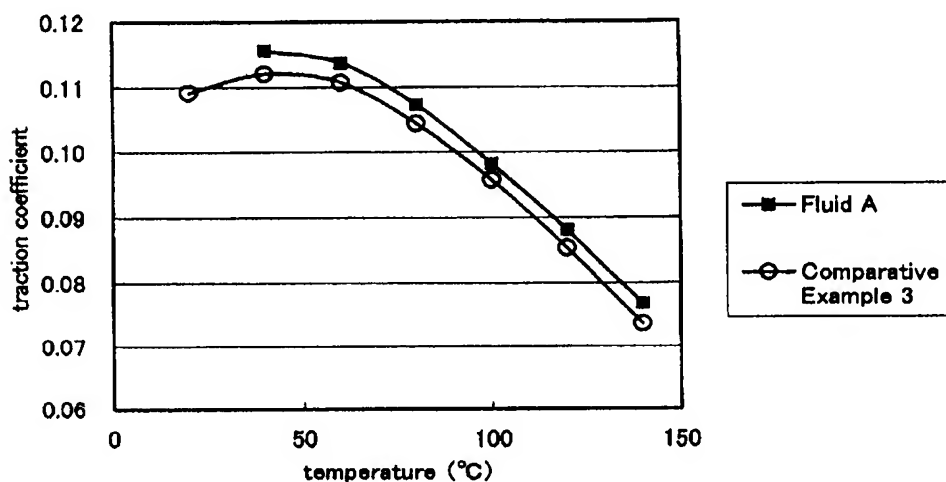
**6) The obviousness rejection of Claims 1-6 and 11-20 as being unpatentable in view of Muari in combination with Holubec or Matsuno is traversed** (Office Action page 7).

As described *supra*, the composition of Claim 1 produces two superior results: 1) the addition of the component B in the traction drive fluid composition of Claim 1 does not decrease the traction coefficient; and 2) the addition of component B in Claim 1 does not significantly increase kinematic viscosity at 100°C. These results are not described or suggested by the cited references, making them superior and unexpected results in light of the cited references. Applicants submit these superior and unexpected results are exactly the types of secondary considerations envisioned by the M.P.E.P. to address a *prima facie* case of obviousness. Withdrawal of the obviousness rejection is requested.

# 7) Conclusion.

Finally, Applicants submit the following data:

Temperature (°C)		20	40	60	80	100	120	140
Traction Coefficient	Fluid A		0.1156	0.1137	0.1073	0.0981	0.0880	0.0768
	Comparative Example 3	0.1091	0.1120	0.1107	0.1043	0.0956	0.0853	0.0736



The above data is a repeat test of Comparative Example 3, which use ethylene / propylene copolymer. In this case high temperature shift is not observed.

Regrettably, we cannot estimate a high temperature shift in Matsuo-fluid 7 using OCP because kinematic viscosity at 40°C is not disclosed in Matsuno.

Applicants submit the present application is now in condition for allowance. Early notification to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.

A handwritten signature in black ink, appearing to read 'Richard L. Treanor', written over a horizontal line.

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